WATER QUALITY AND QUANTITY SURVEY

McCREA HEIGHTS AREA

TOWN OF VALLEY EAST

January 1976

Ministry of the Environment
Ontario

R. E. Moore,
Director
North Eastern Region

WATER QUALITY & QUANTITY SURVEY

McCREA HEIGHTS AREA

TOWN OF VALLEY EAST

(INCLUDING McCREA HEIGHTS SUBDIVISION,

GUILLETVILLE SUBDIVISION AND

LAURENTIAN SUBDIVISION)

JANUARY 1976

Prepared by: Municipal & Private Abatement Section,
Ministry of the Environment

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SUMMARY

A water quality and quantity survey was conducted in September 1975 for the McCrea Heights Area to determine the need for a communal sewer and water project as requested by the Council of the Regional Municipality of Sudbury.

The groundwater throughout the area serviced was found to be of poor quality due to high levels of iron, chlorides and the associated poor colour and turbidity levels. The availability of groundwater was also poor. Several residents reported having a complete lack of supply and a high percentage of the population is subjected to a fluctuating or limited supply. The bacteriological quality of the water appeared to be satisfactory at the time of the sampling.

From the results of the bacteriological and nitrate sampling the operation of the subsurface sewage disposal systems appears satisfactory with the exception of some isolated areas. The continued satisfactory operation of the subsurface sewage disposal systems is doubtful should the project be limited to the communal water system only.

The report recommends that communal services be provided for the McCrea Heights area.

GENERAL

The Council of the Regional Municipality of Sudbury passed a resolution requesting that the Ministry of the Environment construct communal water and sewer services in the McCrea Heights area as a Provincial Project. As a result of this request, a water quality and quantity survey was conducted by staff of the Sudbury District Office of the Municipal and Private Abatement Section on September 28, 29, and 30th, 1975. The survey area included McCrea Heights Subdivision, Guilletville and Laurentian Subdivision.

The objective of this survey was to determine the quality of the groundwater and it's availability as a potable water source, and if there was any pollution of the surface waters.

The map presented in Appendix I prepared by the Regional Municipality of Sudbury's Planning Department, shows the McCrea Heights area and the existing single family dwellings.

The area was developed originally in 1959-60. Development in recent years has been limited. Since 1973 only 5 building permits were issued. It was decided at a Regional Planning Committee meeting on November 6, 1975 that no further building permits would be issued in these areas.

McCrea Heights subdivision, Guilletville and Laurentian subdivisions are located along Hwy 69 immediately south of the community of Val Caron in the Town of Valley East.

McCrea Heights subdivision is the most southerly and is located on a poorly drained rocky plateau. The majority of the housing is to the east of the highway. The area is drained by a small creek which flows to the southeast. There are, however, several other gullies which appear to carry spring runoff. Soil cover is a gravel of limited depth. Bedrock outcrops regularly throughout the subdivision.

Guilletville is the area of strip development along Highway 69 adjacent to McCrea Lake. This area is generally flat and open. Drainage again is poor. Bedrock is also near the surface in this area.

Laurentian Subdivision is the most northerly of the three. This area generally slopes down toward Whitson Lake and a small creek which forms the subdivision's southern boundary. The drainage however, is poor and undefined.

SAMPLING PROCEDURES

At each home visited during the September 28, 29 and 30, 1975 survey, samples were collected for bacteriological examination and nitrate analysis, and a questionnaire was completed. Random samples were also collected for chemical analysis to obtain a representative survey of the groundwater quality.

Further, samples for bacteriological examination were taken on October 14 and 15, 1975 from those residences where adverse bacteriological counts had been obtained in the first "survey".

Water samples from the ditches throughout the area were collected on November 24, 1975 for bacteriological examination.

A copy of the questionnaire is appended (Appendix II). In the questionnaire information was collected with regard to the type and depth of well; quantity and quality of potable water in the user's opinion; and the type of sewage disposal and the user's estimation of its condition. This information is presented in Appendix VII.

All samples collected in September were analyzed at the Ministry of the Environment Laboratory in Toronto. The samples collected during the resampling of the residences in October and those from the surface waters sampled in November were taken to the Ministry of Health Laboratory in Sudbury.

The number of single family dwellings visited in each area is given in the table below.

Subdivision	No. of Units	No. of Samples	% Sampled
Laurentian	76	20	26%
Guilletville	61	8	13%
McCrea Heights	110	25	23%
Totals	247	53	21%

SANITARY WASTE DISPOSAL

The existing sewage disposal systems, as determined from the questionnaire completed during the survey, consist of septic tanks and leaching beds. During the period between January and October, 1975 the Sudbury and District Health Unit reported four sewage related complaints from this area.

The lots in these areas all exceeded 15,000 square feet in area, but the area which can be used for the installation of subsurface sewage disposal systems on many lots is limited due to topographical or poor soil conditions (i.e. wet swampy terrain or bedrock outcropping).

Water samples for bacteriological examination were collected from the ditches and surface waters in the three subdivisions to determine if there is any impairment caused by malfunctioning subsurface sewage disposal systems. The results are presented in Appendix V.

The existing subsurface sewage disposal systems appeared to be operating satisfactorily. The results of the nitrate and bacteriological sampling of the potable and the surface waters were generally within the Ministry of the Environment guidelines. However, Hubert Street in Guilletville and Donaldson Crescent in the McCrea Heights subdivision are areas where the results indicated that raw or partially treated sewage and wash or kitchen wastes respectfully, (see Appendix V) are being discharged into the ditches.

The satisfactory operation of the septic tanks in these subdivisions may be attributed to the limited water consumption in many of the residences. Presently some residents must travel to Sudbury and Val Caron in order to obtain acceptable drinking water and adequate laundry facilities due to the extremely high colour of the groundwater.

If a communal water system was installed the water consumption could be expected to increase substantially. This increase in water consumption could then cause many of the subsurface sewage disposal systems to malfunction.

WATER SUPPLY

The Ministry of the Environment publication "Water Well Records for Ontario, 1946-1969", indicates that a large number of wells have been drilled in this area. The wells vary in depth between 12 and 302 feet and the pumpage rates are shown as between 1 to 8 gallons per minute. It would appear however, that the average pumpage rate would be 1 to 3 gallons per minute. The record indicates that there were very few dry wells drilled.

Many of the residents of Guilletville adjacent to McCrea Lake are using the lake as a source of water supply. The sample collected at Mr. C. Boucher's residence, sample number MH-105, represents water obtained from the lake. During the survey it was noted that several plastic lines had been layed in a shallow trench presumably to supply lake water to residences on the west side of highway 69N.

In order to provide a convenient supply of potable water the Regional Municipality of Sudbury installed an outlet at the water storage tank which is located at the north end of the study area.

The table below was derived from the results of the samples collected from each residence.

BACTERIOLOGICAL EXAMINATION OF WATER SUPPLIES

Good	Adverse
93%	7%

The following information on the potable water supply was obtained from the questionnaire.

SOURCE OF WATER SUPPLY

Drilled Well	Dug Well	Surface Supply
77%	17%	6%

WATER QUALITY

Good	Poor
4%	96%

WATER QUANTITY

Good	Poor
47%	53%

DISCUSSION OF RESULTS

The chemical analytical results of the water samples collected during the survey are presented in Appendix III. The results show that the water is hard to very hard. Iron concentrations exceeded this Ministry's limit of 0.3 mg/l in 73% of the samples. The limit for iron was set for aesthetic and taste considerations rather than physiological. Some intake of iron is essential for health reasons. The chloride limit of 250 mg/l was exceeded in 13% of the samples. However, 70% of the samples exceeded 100 mg/l. The threshold level for taste varies from 100 to 250 mg/l. It is considered that generally chloride is not harmful; however some possibility exists of it being injurious to the health of persons suffering diseases of the heart or kidneys. The salty taste experienced by some people is imparted by sodium, potassium or calcium salts.

Due to the high levels of iron, in the water the colour and turbidity units were also high. Colour is imparted by organic materials. The staining of food, fixtures and the dulling of clothes has been known to occur when contacted with waters containing high colour. Turbidity is attributed to suspended or colloidal matter. In this area, iron which has been oxidized and precipitated as a solid, forms this colloidal material.

The results of the first and second bacteriological examination of the potable water supplies are presented in Appendix IV. The difference between the number of samples which were satisfactory the second time when compared to the original samples, is due to the method of sampling used. The original samples were collected after allowing the tap to run for several minutes whereas during the second sampling the taps were flamed using a match. This may have provided better disinfection of the tap, preventing sample contamination. No nitrate levels in the potable water supplies sampled were found that exceeded this Ministry's limit of 10 mg/l as "N".

Appendix VII was tabulated using the information obtained from the questionnaire with regard to potable water. Water quantity problems were experienced by 53% of the people questioned. Of these people, 12% said they had no water. When collecting the samples it was noted that hydrogen sulphide was present in two wells and foaming and a salty taste occurred in several other wells.

The bacteriological examination (Appendix V) of the surface water samples indicated the possibility of problems in three areas. The sample locations are plotted on Appendix VI. In Laurentian subdivision, on Laurentian Crescent, samples collected from the ditch contained total and faecal coliform organisms. These levels however, were below that recommended by the Ministry of the Environment for recreational use. The levels obtained were 600 total coliform - 96 faecal coliform and 210 total coliform - 40 faecal coliform and are not high enough to indicate the presence of sewage.

A sample collected from the ditch on Hubert Street in Guillet-ville contained 80,000 total coliform and 28,000 faecal coliform. These levels exceeded our limits for recreational use of surface water and indicate the presence of malfunctioning subsurface sewage disposal systems.

The results of the bacteriological examination of the samples collected from Donaldson Crescent indicated the presence of wash water or kitchen wastes. The remaining samples, from the McCrea Heights subdivision, were satis-factory at the time of sampling.

CONCLUSION

From the results of the samples collected for chemical analysis it is evident that the groundwater is of poor quality due to the high levels of iron and chlorides and the associated high levels of colour and turbidity. The nitrate levels in the groundwater did not exceed the Ministry of the Environment limit.

The bacteriological quality of the groundwater appears to be acceptable. Only 7% of the samples were of unsatisfactory quality.

The amount of groundwater is also limited as indicated by 53% of the residents who stated that they had poor water quantity. This water shortage is common to both the dug and drilled wells in the area.

From the bacteriological samples collected, from the surface waters, it does not appear as though there are many malfunctioning subsurface sewage disposal systems with the exception of Hubert Street in Guilletville and Donaldson Crescent in McCrea Heights Subdivision.

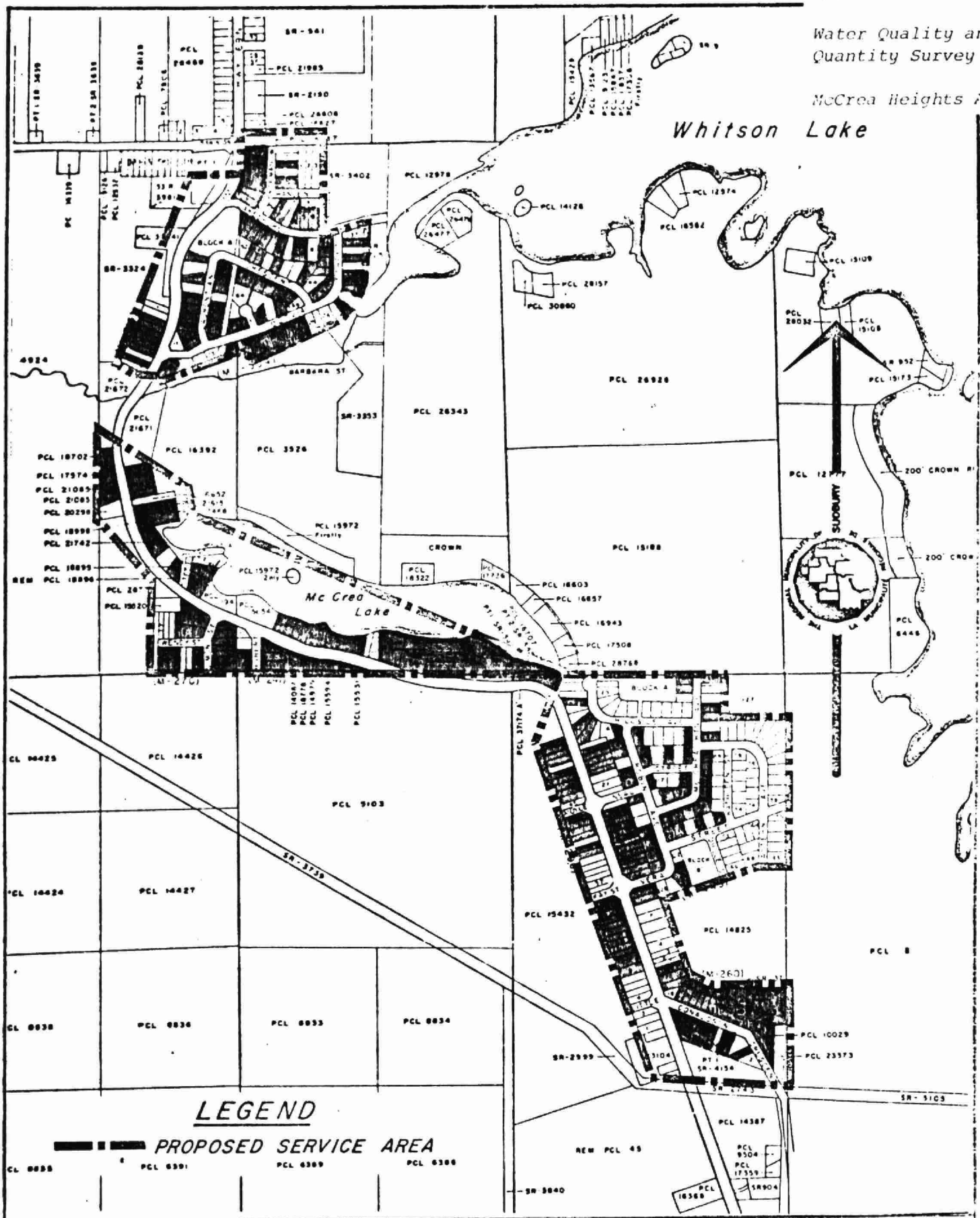
If there was an adequate supply of water in these subdivisions, it is expected that the existing subsurface sewage disposal systems would become overloaded and fail due to the increase in water consumption. The nature of soil (depth to water table and bedrock) and the outcropping of bedrock make improvement of subsurface sewage disposal systems difficult and expensive.

RECOMMENDATIONS

It is recommended that communal water and sewer services be provided.

Prepared by:

R. T. Harris,
Environmental Officer.



REVISIONS		REGIONAL MUNICIPALITY OF SUDBURY	DRAWN BY W. CHUNG
DATE	BY		DATE JUNE / 75
		McCREA HEIGHTS SERVICES	SCALE N. T. S.
			A-1160 (4 of 10)

TOWNSHIP OF _____

COMMUNITY OF _____

Water Quality and Quantity Survey

Questionnaire

NAME _____

MAILING _____

ADDRESS _____

SOURCE _____
(Well type; depth, etc.)

WATER SUPPLY

INDIVIDUAL _____ COMMUNAL _____

PROBLEMS _____

_____

_____

DOMESTIC WASTE DISPOSAL

TYPE _____
(Septic tank; length of tile field)

CONNECTIONS _____
(all toilets, sinks, washwater)

NO. OF USERS _____

PROBLEMS _____
(maintenance, etc.)

_____

GENERAL REMARKS

_____

_____

SAMPLES

CHEMICAL _____ BACTERIOLOGICAL _____

RESULTS:

Total Coliforms _____

Faecal Coliforms _____

Background Organisms _____

LOCATION MAP

LOT SIZE _____ FT. X _____ FT. LOT AREA _____ SQ. FT.

APPENDIX THREE
WATER QUALITY AND QUANTITY SURVEY

McCREA HEIGHTS AREA
CHEMICAL ANALYSIS
SEPTEMBER, 1975
LAURENTIAN SUBDIVISION

Sample Location and Sample No.	Bacteriological* Examination	Nitrate	Hardness $CaCO_3$	Alkalinity $CaCO_3$	Iron	Chloride	pH	Colour	Turbidity
R. Pepin MH-1	A	9.4	220	38	1.3	80	5.5		
C. Belanger MH-2	A	2.4							
R. Brunette MH-3	A	0.4							
E. Ferron MH-4	P	0.2							
G. Goodwin MH-5	P	1.4	416	150	0.45	209	6.7		
P. Whissel MH-6	A	0.8							
O. Dreika MH-7	A	0.2							
D. Moyle MH-8	A	0.2	392	145	0.25	200	7.2		
N. Santerre MH-9	A	0.2							
D. LaRose MH-10	A	0.2							
R. LeBlanc MH-11	P	2.0	160	30	2.9	234	5.6		

APPENDIX THREE

Sample Location and Sample No.	Bacteriological* Examination	Nitrate	Hardness $CaCO_3$	Alkalinity $CaCO_3$	Iron	Chloride	pH	Colour	Turbidity
E. Champagne MH-12	P	1.6							
D. Gingras MH-13	A	0.2							
R. Bouthillette MH-14	A	0.2	1	230	0.1	146	6.5		
T. Amyotte MH-15	P	0.2							
R. Gerard MH-16	A	0.2							
A. Fairbairn MH-17	A	1.8							
W. Lundquist MH-18	A	0.5	340	120	2.1	198	6.5		
P. Matusch MH-19	A	0.4							
R. Barriault MH-20	A	0.2							
		GUILLETTE VILLE SUBDIVISION							
G. Upfold MH-100	A	0.2	278	82	1.1	171	6.3	30	6.7
W. Barriault MH-101	A	0.2							

APPENDIX THREE

Sample Location and Sample No.	Bacteriological* Examination	Nitrate	Hardness $CaCO_3$	Alkalinity $CaCO_3$	Iron	Chloride	pH	Colour	Turbidity
D. Caron MH-102	A	0.2							
A. Carriere MH-103	P	0.2	256	204	6.0	4.8	7.0	200	56
J. Caron MH-104	A	1.8							
C. Boucher MH-105	P	0.2	58	24	7.0	57	6.2	7250	52
S. Brown MH-106	A	0.2	284	153	0.4	44	7.1	15	3.3
Y. Labelle MH-107	A	0.6	282	167	0.3	86	7.5	10	1.7
		McCREA HEIGHTS SUBDIVISION							
A. Gobert MH-1001	A	0.2	69	200	3.4	123	6.7	125	4.9
C. Hamilton MH-1002	A	0.2	58	133	1.1	249	6.0	30	4.5
L. Williamson MH-1003	P	0.2	303	89	13.6	136	6.0	7250	91
G. Middleton MH-1004	A	6.8	71	120	1.1	117	5.9	70	2.9
L. Dhinel MH-1005	A	0.2	204	83	0.05	2	7.2	15	0.48

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Sample Location and Sample No.	Bacteriological* Examination	Nitrate	Hardness $CaCO_3$	Alkalinity $CaCO_3$	Iron	Chloride	pH	Colour	Turbidity
O. Chevrette MH-1006	P	0.2	411	192	5.3	189	6.8	150	34
R. H. Jokinen MH-1007	P	4.4	420	152	1.1	259	6.0	20	2.8
J. M. Tremblay MH-1008	A	0.2							
Mrs. Johns MH-1010	A	0.2	468	50	12	391	5.9	7250	100
B. Prince MH-21	A	9.5	280	132	2.2	133	6.5		
M. Donaldson MH-22	P	0.2							
W. Wilson MH-23	A	0.4	288	204	1.4	55	6.5		
L. Mayotte MH-24	P	0.4							
E. Jolly MH-25	A	0.2							
W. Galenger MH-26	A	1.2							
N. Bobbie MH-27	A	0.2							
P. Ducette MH-28	A	0.2	284	80	2.2	200	6.2		

APPENDIX THREE

Sample Location and Sample No.	Bacteriological* Examination	Nitrate	Hardness $CaCO_3$	Alkalinity $CaCO_3$	Iron	Chloride	pH	Colour	Turbidity
I. Duchesne MH-29	A	0.2							
D. Doval MH-30	A	0.2							
A. St.Onge MH-31	P	0.2							
M. Yaroschak MH-32	A	0.2							
I. Brown MH-33	A	0.2	392	140	26.0	438	6.1		
M. Boissonneault MH-34	A	0.2							
H. Bartsch MH-35	P	0.2							
W. Sagle MH-36	P	0.8							

* Presence (P) - Absence (A) test performed

All Results in mg/l

APPENDIX FOUR
WATER QUALITY AND QUANTITY SURVEY

McCREA HEIGHTS AREA
BACTERIOLOGICAL EXAMINATION
RESULTS

Sample Location and Sample No.		**First Examination September, 1975	Second Examination* October, 1975	
			Total Coliform Organism	Faecal Coliform Organism
MH-1	R. Pepin	A		
MH-2	C. Belanger	A		
MH-3	R. Brunette	A		
MH-4	E. Ferron	P	0	0
MH-5	G. Goodwin	P	0	0
MH-6	P. Whissel	A		
MH-7	O. Dreika	A		
MH-8	D. Moyle	A		
MH-9	N. Santerre	A		
MH-10	D. LaRose	A		
MH-11	R. Leblanc	P	0	0
MH-12	E. Champagne	P	0	0
MH-13	D. Gingras	A		
MH-14	R. Bouthillette	A		
MH-15	T. Amyotte	P	4	0
MH-16	R. Gerard	A		
MH-17	A. Fairbairn	A		
MH-18	W. Lundquist	A		
MH-19	P. Matsch	A		
MH-20	R. Barriault	A		
MH-100	G. Upfold	A		
MH-101	W. Barriault	A		
MH-102	D. Caron	A		
MH-103	A. Carriere	P	***	***
MH-104	J. Caron	A		
MH-105	C. Boucher	P	Surface Water Supply	

APPENDIX FOUR

Sample Location and Sample No.		**First Examination September, 1975	Second Examination* October, 1975	
			Total Coliform Organism	Faecal Coliform Organism
MH-106	S. Brown	A		
MH-107	Y. Labelle	A		
MH-21	B. Prince	A		
MH-22	M. Donaldson	P	0	0
MH-23	W. Wilson	A		
MH-24	L. Mayotte	P	***	***
MH-25	E. Jolly	A		
MH-26	W. Galenger	A		
MH-27	N. S. Bobbie	P	***	***
MH-28	R. Ducette	A		
MH-29	I. Duchesne	A		
MH-30	D. Duvall	A		
MH-31	A. St.Onge	P	24	8
MH-32	M. Yaroschak	A		
MH-33	I. Brown	A		
MH-34	M. Boissonneault	A		
MH-35	H. Bartsch	P	2	0
MH-36	W. Sagle	P	0	0
MH-1001	M. A. Cabert	A		
MH-1002	C. Hamilton	A		
MH-1003	L. Williamson	P	0	0
MH-1004	G. Middleton	A		
MH-1005	L. Khinel	A		
MH-1006	O. Chevrette	P	0	0
MH-1007	R. H. Jokinen	P	24	20
MH-1008	J. M. Tremblay	A		
MH-1010	Mrs. Johns	A		

APPENDIX FOUR

Sample Location and Sample No.		**First Examination September, 1975	Second Examination* October, 1975	
			Total Coliform Organism	Faecal Coliform Organism
MH-1006	O. Chevrette	P	0	0
MH-1007	R. H. Jokinen	P	24	20
MH-1008	J. M. Tremblay	A		
MH-1010	Mrs. Johns	A		

* Results expressed in numbers per 100 ml.
** Presence (P) - Absence (A) test performed
*** Could not be re-sampled

APPENDIX FIVE
WATER QUALITY AND QUANTITY SURVEY

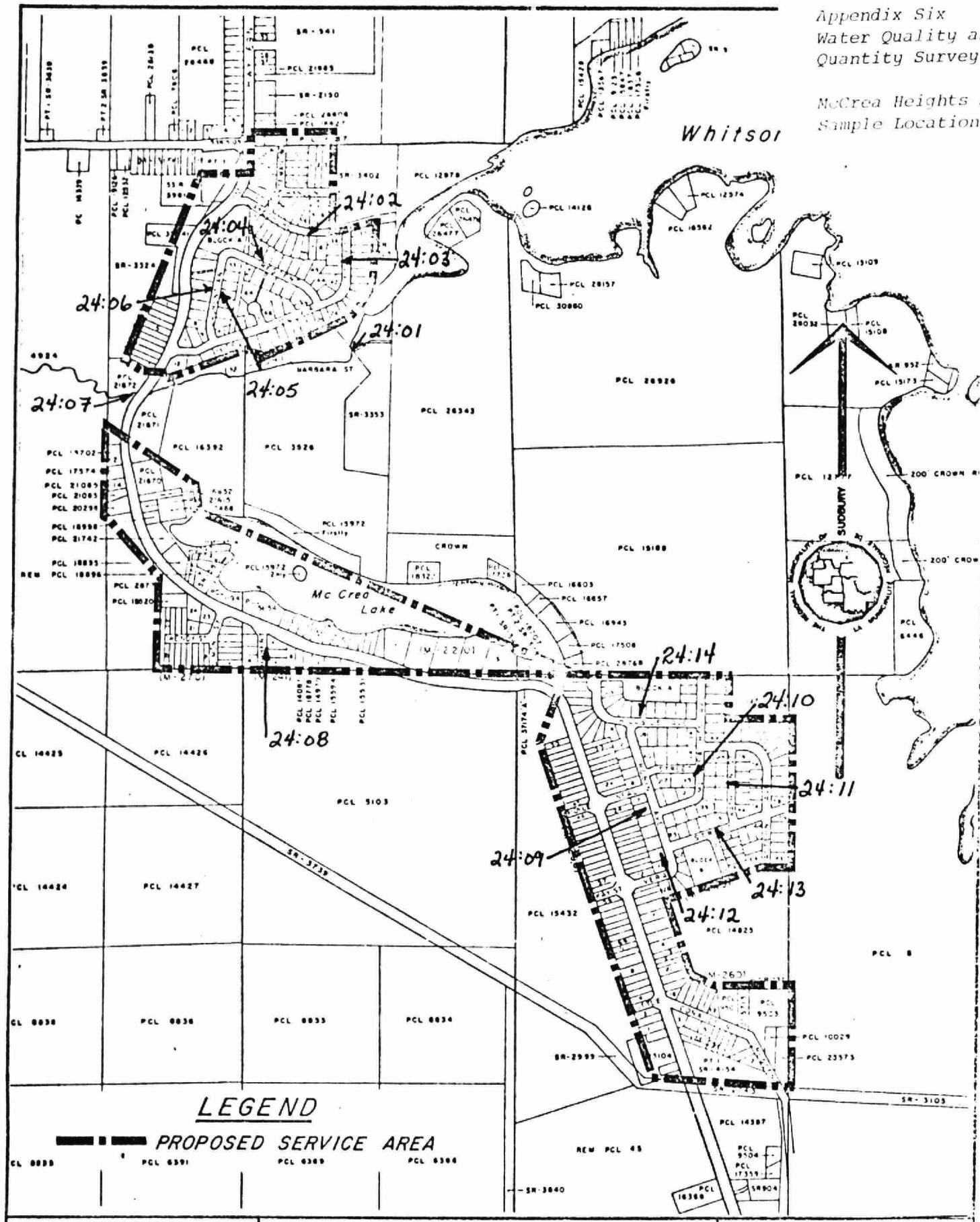
McCREA HEIGHTS AREA
November, 1975
BACTERIOLOGICAL EXAMINATION RESULTS OF SURFACE WATER SAMPLES

Sample Location and Sample No.	Total Coliform Organisms	Faecal Coliform Organisms
Creek at Laurentian Recreation Centre 24.01	16	2
Culvert - 1534 Lakeshore Drive 24.02	95	4
Ditch - 1488 Olivia Drive 24.03	6	0
Ditch - 2280 Laurentian Drive 24.04	600	96
Ditch - 2246 Laurentian Drive 24.05	230	0
Ditch at Hwy. 69 N. (North Olivia St.) 24.06	210	40
Ditch at Hwy. 69 N. (South Olivia St.) 24.07	0	0
Ditch - Hubert Street and Hwy. 69 N. 24.08	80000	28000
Creek - Robin and Neal Streets 24.09	10	2
Creek - 1794 McCrea Hts. Dr. 24.10	30	0
Creek at rear of McCrea Hts. Dr. 24.11	38	2
Ditch - Kathleen and Vera St. 24.12	4	0
Ditch - Vera St. and Oriole St. 24.13	96	0
Ditch - Hillside and Robin St. 24.14	0	0
Ditch - 1208 Donaldson Crescent 24.15	1100	0
Ditch - 1166 Donaldson Crescent 24.16	14000	80
Ditch - 1190 Donaldson Crescent 24.17	44	2

* Numbers expressed per 100 ml.

Appendix Six
Water Quality and Quantity Survey

McCrea Heights Area Sample Locations



REVISIONS		REGIONAL MUNICIPALITY OF SUDBURY	DRAWN BY W. CHUNG
DATE	BY		DATE JUNE / 75
		McCREA HEIGHTS SERVICES	SCALE N. T. S.
			A - 1160 (4 of 10)

APPENDIX SEVEN
WATER QUALITY AND QUANTITY SURVEY

McCREA HEIGHTS AREA
QUESTIONNAIRE INFORMATION

Sample Location and Sample No.		Type of Well	Depth	Water Quality	Water Quantity
		Laurentian Subdivision			
MH-1	R. Pepin			Poor (Iron)	Poor
MH-2	C. Belanger				Good
MH-3	R. Brunette				Good
MH-4	E. Ferron	Drilled	105'		Poor (Out)
MH-5	G. Goodwin			Poor (Iron)	Poor
MH-6	P. Whissel	Drilled	160'		Poor (Out)
MH-7	O. Dreika	Drilled	115'		Poor (Out)
MH-8	D. Moyle	Drilled	66'	Poor (Iron)	Poor (Out)
MH-9	N. Santerre	Drilled	55'		Poor
MH-10	D. LaRose	Drilled	120'		Poor
MH-11	R. LeBlanc	Drilled	110'		Poor
MH-12	E. Champagne	Drilled	100'		Poor
MH-13	D. Gingras	Drilled	160'		Good
MH-14	R. Bouthillette		17'	Good	Poor
MH-15	T. Amyotte				Poor
MH-16	R. Gerard				Poor (Out)
MH-17	A. Fairbairn			Foam	Poor
MH-18	W. Lundquist			Poor (Iron)	Good
MH-19	P. Matusch				Poor
MH-20	R. Barriault				Poor (Out)
		Guillette Ville Subdivision			
MH-100	G. Upfold	Drilled		Poor (Iron)	Good
MH-101	W. Barriault	Drilled	28'		Good
MH-102	D. Caron	Drilled	89'		
MH-103	A. Carriere	Dug	25'	Poor (Iron)	Poor
MH-104	J. Caron	Dug	18'		Good

APPENDIX SEVEN

Sample Location and Sample No.		Type of Well	Depth	Water Quality	Water Quantity
MH-105	C. Boucher	Surface supply McCrea Lake			
MH-106	S. Brown	Drilled	120'	Poor (Iron)	Good
MH-107	Y. Labelle	Dug		Poor (Colour Turbidity)	Poor
		McCrea Heights Subdivision			
MH-21	B. Prince			Poor (Nitrate Iron)	
MH-22	M. Donaldson	Spring			
MH-23	W. Wilson	Drilled	45'	Poor (Iron)	Good
MH-24	L. Mayotte	Dug	8'		Good
MH-25	E. Jolly				Good
MH-26	W. Galenger				Poor
MH-27	N. S. Bobbie	Dug	9'		Good
MH-28	R. Ducette	Dug	9'	Poor (Iron)	Good
MH-29	I. Duchesne	Drilled	89'		Poor
MH-30	D. Duval	Drilled			Good
MH-31	A. St.Onge	Drilled	50'		Good
MH-32	M. Yaroschak	Drilled	136'		Good
MH-33	I. Brown	Drilled	80'	Poor (Iron Chloride)	Good
MH-34	M. Boissonneault				Good
MH-35	H. Bartsch				Good
MH-36	W. Sagle		12'	Salt	Poor
MH-1001	M. A. Gabert	Drilled	180'	Poor (Iron H_2SO_4)	Good
MH-1002	C. Hamilton	Drilled	130'	Poor (Iron)	Good
MH-1003	L. Williamson	Drilled	46'	Poor (Iron H_2SO_4)	Good
MH-1004	G. Middleton	Drilled	28'	Poor (Iron)	Poor
MH-1005	L. Dhinel	Drilled	225'	Poor (Colour)	Poor

APPENDIX SEVEN

Sample Location and Sample No.	Type of Well	Depth	Water Quality	Water Quantity
MH-1006 O. Chevrette			Poor (Iron)	Good
MH-1007 R. H. Jokinen	Drilled	185'	Poor (Iron Chloride)	Poor
MH-1008 J. M. Tremblay	Drilled	120'		Poor
MH-1010 Mrs. Johns	Drilled	43'	Poor (Iron Chloride)	Poor

APPENDIX EIGHT

GLOSSARY

(i) BACTERIOLOGICAL EXAMINATION

Total Coliform Organisms

Total coliform organisms include a wide variety of bacteria ranging from the genus (Group), Escherichia Coli, which originate mainly in the intestines of man and other warm-blooded animals, to the genera Citrobacter and Enterobacter aerogenes. The latter genera are basically found in soil but are also present in faeces in small numbers.

The presence of total coliforms in water may indicate soil runoff or more important, less recent faecal pollution since organisms of the Enterobacter - Citrobacter groups tend to survive longer in water than do members of the Escherichia Coli group, and even multiply when suitable environmental conditions exist.

Faecal Coliform Organisms

The faecal coliform organisms are those coliform bacteria which are all intestinal in origin and usually outnumber all other coliform types in human and animal intestines. Most of the coliform bacteria found by the faecal coliform test are of the gunus Escherichia Coli. However, their death rate outside the warm body is high and accordingly if coliforms present in the water are primarily faecal coliforms, and their number is high, the pollution is probably nearby and recent. Smaller numbers with a high portion of faecal coliforms may indicate nearby pollution with counts reduced by dilution.

Results are reported "coliform count per 100 millilitres".

(ii) CHEMICAL ANALYSIS

Hardness

The total hardness measures the "soap consuming power" of a water due to the presence of metallic cations. The principle components of hardness are calcium and magnesium although a number of heavy metals may contribute to a small extent. The hardest waters are usually encountered in regions with thick top soil layers and extensive limestone deposits.

Hard waters are objectionable because they form insoluble compounds or curds with soap. This substantially reduces the efficiency of washing procedures even when detergents are used. Waters with high hardness are known to cause the formation of a lime scale in plumbing fixtures.

Alkalinity

The alkalinity of the water is generally used to define the buffering capacity or the waters capability to resist a change in pH. This means that if an acidic waste is discharged to a natural water system the effect on the water may not necessarily be detected as a pH change but will be detected as a drop in alkalinity.

Iron

Iron is the most abundant of the heavy metals in nature, but despite this abundance, it is generally found in relatively low levels in natural surface waters. Iron is non-toxic even at high levels but becomes objectionable in water because of the colour and bitter taste it imparts. The water quality objective for Ontario drinking water is 0.3 mg/l as iron.

Chloride

Chloride is a major anion in domestic wastes and in many natural water supplies. Urban runoff often contains high concentrations of chloride in the winter time due to road application of salt.

Chloride poses no direct health hazard, but the water quality objective for domestic water supplies has been specified at 250 mg/l to prevent a salty taste. This salty taste is variable and dependent on the composition of the water. If chloride is present as sodium chloride a detectable taste will be present at 250 mg/l. If chloride is present as calcium or magnesium chlorides, waters containing as much as 1,000 mg/l may not have a noticeable taste.

pH

The Hydrogen Ion concentration in water is measured as pH. Specifically, it is the negative logarithm of the hydrogen ion concentration expressed in moles per litre. Thus, each change of one unit in pH corresponds to a 10 fold change in the hydrogen ion concentration.

Apparent Colour Units

Many lakes and rivers, especially in Northern Ontario, have a characteristic yellowish-brown colour due to the presence of humic acids derived from the decomposition of plants. Lakes of this type are commonly referred to as "acid bog" or "brown water" lakes. A similar colour may also occur when iron and maganese are found in abundance.

Water coloured naturally by humic substances is harmless, but considered unacceptable for drinking purposes because of its appearance. The objective of 5 colour units for domestic water supplies is therefore based on aesthetic rather than on health standards.

Turbidity

The turbidity is a measure of the opticle properties of a sample which causes light to be scattered and adsorbed rather than transmitted in a straight line. Historically, the turbidity was measured using a Jackson candle turbidmeter, but the insensitivity of this instrument lead to the development of secondary techniques which can measure the much lower turbidities commonly encountered in modern water treatment processes.

Specific Conductance

The specific conductance is a measure of a waters capacity to carry an electric current. This property is related to the total concentration of ionized substances in the water. The conductivity of natural waters is mainly due to the presence of calcium, magnesium, sodium, potassium, bicarbonate, chloride, sulphate and nitrate ions.

Specific conductance related quite well to the total dissolved solids concentration. Ontario rivers and lakes free of industrial wastes, have a total dissolved solids concentration generally equal to 0.65 $\pm$ 0.10 x the specific conductance.

Nitrate (Nitrogen)

Nitrates are formed via the oxidation of nitrite by autotrophic nitrifying bacteria and represents the most highly oxidized form of nitrogen in the nitrogen cycle. It is generally found at trace levels in all surface waters but may become very high in ground waters as a result of soil leaching.

Nitrates are objectionable because their nutritive properties promote the excessive growth of algae and other aquatic plants. Excessive amounts in drinking water contribute to a disease known as infant methemoglobinemia in which the oxygen carrying capacity of the blood is inhibited. The maximum acceptable level for domestic water supplies in Ontario is 10 mg/l of nitrate as nitrogen in the water if it is to be used for infant feeding. Nitrates are non-toxic to adults.